Department of Labor and Industries

ELECTRICAL CURRENTS

Code guidance from the Department of Labor and Industries
Office of the Chief Electrical Inspector

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Electrical code issues and answers.

● Ready for inspection?

What work needs to be done before an electrical installation is considered "ready for inspection?" The answer depends on the scope of work, size of the job, type of construction, and the fee paid for the electrical work permit. Some projects require progressive inspections while others do not.

Permit fees are described in WAC 296-46-910 and all fees are calculated per sections (1) through (5). These fees have been established to fully fund the cost of the electrical inspection program. The cost of re-inspecting corrections is estimated and averaged into the fees in the schedule. On all jobs where the inspection fee in WAC 296-46-910 is less than the equivalent of two progress inspections ($64.50), it is intended that the work done will be inspected in one trip to the job site. A job requiring more than one requested inspection trip must have a fee that supports the number of progressive inspections made. Those that do not will be assessed progressive inspection fees as described in WAC 296-46-910(5)(k) MISCELLANEOUS. (A re-inspection trip to verify the completion of electrical safety corrections written during a requested inspection is not charged as a progressive inspection trip.)

For non-progressive inspection jobs, "ready for inspection" means that all electrical work other than the final trim is completed. This includes installation of all overcurrent protection devices (circuit breakers and fuses), all circuits identified in the panel schedule, and completion of all wiring involved in the work being done.

For projects that need progressive type inspections, "ready for inspection" means that all electrical work in the area to be inspected is complete. All structural elements and mechanical systems, such as plumbing, duct work, and heating and air conditioning equipment, must be installed in the areas where electrical inspection is requested. Electrical inspectors will not make assumptions about the equipment installations being done by other trades that may effect the access to or safety requirements of the electrical equipment.

● Multiple wire terminations in the same terminal lug

NEC 110-14(a) of the states in part that: *"Terminals for more than one conductor and terminals used to connect aluminum shall be so identified."* NEC 110-3(b) requires that: *"Listed or labeled equipment shall be installed, used, or both, in accordance with any instructions included in the listing or labeling."* The listing and labeling of terminals includes the conductor size, the number of conductors, and any combinations of conductors that are allowed to terminate in a single lug. This information may be marked directly on the terminal or may be included in manufacturer's information located on the equipment, such as a panelboard label.

The instructions in a panelboard may allow multiple wire terminations on a neutral bar terminal. However, most panelboard manufacturers only allow multiple equipment grounding conductors in a single terminal. Grounded circuit (neutral) conductors are usually limited to one wire per terminal. Most grounded branch circuit (neutral) conductors carry the full circuit current while the circuit is in use. The regular heating and cooling effects of variations in branch circuit current flow cause expansion and contraction of the conductors and can cause doubled-up neutral terminations to loosen in the lug. Equipment grounding conductors do not carry any current during normal branch circuit operation. The installer must read the manufacturer's installation instructions included with a panelboard to determine if the terminals are approved for multiple neutral conductors and/or multiple equipment grounding conductors.

● Electrical continuity of metal raceways and enclosures

(NEC 300-10) requires, *"Metal raceways, cable armor, and other metal enclosures for conductors shall be metallically joined together into a continuous electric conductor and shall be so connected to all boxes, fittings, and cabinets as to provide effective electrical continuity."* When installing rigid metal conduit the use of two locknuts, one inside and one outside of each enclosure, is required. Other approved conduit fittings, such as threaded conduit hubs and connectors with shoulders that seat firmly against an enclosure can also meet the continuity requirements above. When required by NEC 250-72 for service-type bonding, the installation of grounding bushings or other approved bonding fittings does not eliminate the need for double locknuts. Rigid metal conduit and conduit nipples,

regardless of length, must be secured to enclosures using two locknuts. Locknuts are cupped or serrated on one side to insure that good metal to metal contact is made between the locknut and the enclosure. In order to obtain the continuity required by NEC 300-10, a locknut must bind into the metal of the enclosure from each side. This correction is written most often when conduit nipples are installed between meter enclosures and service panels and the installer does not position the required backing locknuts behind both enclosures.

● Inspection fees for mobile homes, modular homes, commercial coaches, etc.

A mobile home service fee (from WAC 296-46-910(1)(e)(i) RESIDENTIAL) is intended for inspection of a service on a mobile home lot, regardless of ampacity, supplying a mobile home feeder. A mobile home feeder, not inspected at the same time as the service, has a separate fee (also from WAC 296-46-910(1)(e)(i) RESIDENTIAL). If both the mobile home service and feeder are ready for inspection at one time, the fee for inspecting both is reduced and shown in WAC 296-46-910(1)(e)(ii). A dwelling unit modular building (FAS gold label) service or feeder is inspected for the same fee as a mobile home service or feeder.

On residential property with a mobile or modular home, inspection fees for outbuildings and detached garages are from WAC 296-46-910(1)(a)(ii) and (iii). An "outbuilding" is a structure that serves a direct accessory function to a residence, such as a pump house or storage building. "Outbuildings" do not include buildings used for commercial type occupancies or additional dwelling occupancies. All other structures, services, and feeders on residential property will have inspection fees based on table WAC 296-46-910(1)(b) and the ampacity of the service or feeder equipment.

Inspection fees for services or feeders to modular buildings (FAS gold label) intended for educational, office, or other non-dwelling unit use are calculated from the tables in WAC 296-46-910(2)(a) COMMERCIAL / INDUSTRIAL. Services and feeders for commercial coach (FAS black label) units are priced from the same commercial / industrial tables. Commercial coaches used in temporary applications will be permitted to have service and feeder fees calculated from the tables in WAC 296-46-910(3)(b) TEMPORARY SERVICES. Temporary electrical power and lighting installations are intended to be used during the period of construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities. Temporary electrical power and lighting installations are allowed during emergencies and for tests, experiments, and developmental work. Temporary electrical power and lighting installations are allowed for a period not to exceed 90 days for Christmas decorative lighting and similar purposes. Temporary wiring shall be removed immediately upon completion of construction or purpose for which the wiring was installed.

● Wiring methods required inside walk-in coolers and freezers

The interiors of walk-in coolers and freezers will be permitted to be wired as dry locations as defined in NEC Article 100: *"A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction."* Though such properly operating coolers and freezers are usually subject to dampness or wetness only during cleaning or maintenance operations, preventing the introduction of moisture from outside the refrigerated environment is essential to keeping the interior a dry location. All installations must have the interior raceway system penetrations to the outside sealed to prevent the circulation of air from warmer areas to colder areas, as required by NEC 300-7(a). Duct seal or spray-foam insulation properly installed can provide adequate sealing to prevent air circulation and the resulting condensation.

Although the space is classified as a dry location, field installed wiring inside coolers and freezers has additional requirements that must be considered. Wiring should be in raceway to protect conductors from physical damage. Lighting fixtures should be guarded to prevent physical damage. Contractors and electricians should be aware that local health officials may enforce additional requirements and restrictions on equipment installed inside walk-in coolers and freezers in order to maintain proper sanitation in such food storage and handling areas.

● 3rd and 4th year trainee cards are required to accumulate the hours for eligibility to test for journeyman electrician certification

This information appeared in a previous ELECTRICAL CURRENTS (Vol. 1, No. 4; April 1998), but it bears repeating. Hours toward journeyman or specialty electrician experience cannot be accumulated unless you have a valid training certificate in your possession. A training certificate must be renewed annually. An individual that has a valid specialty electrician certificate must also have a current training certificate in order to record hours of experience toward an additional specialty or toward journeyman certification. A specialty electrician certificate only qualifies an individual to do work in their specialty; it is not equivalent to a training certificate.